Jewish Genetics: Abstracts and Summaries

A collection of abstracts and reviews of books, articles, and genetic studies

This section is the most comprehensive summary of Jewish genetic data. In recent years, advances in genetic technology and the broadening in scope of genetic studies to encompass more ethnic groups have allowed scientists to come to more accurate conclusions. Now that we have the benefit of more than a decade of comprehensive genetic testing of Jewish populations using modern techniques, we have finally come close to answering all the questions about Jewish ancestry. Part of the story is that Eastern European Jews have significant Eastern Mediterranean elements which manifest themselves in close relationships with Kurdish, Armenian, Palestinian Arab, Lebanese, Syrian, and Anatolian Turkish peoples. This is why the Y-DNA haplogroups J and E, which are typical of the Middle East, are so common among them. Jewish lineages from this region of the world derive from both the Levant and the Anatolia-Armenia region. At the same time, there are traces of European (including Northern Italian and Western Slavic including Polish), Northwest African (Berber), and East Asian ancestry among European Jews. Many Greek and Roman women married Jewish men before conversion to Judaism was outlawed by the Roman Empire, and many of the Southern European ancestral lines in Ashkenazic families come from these marriages. Ethiopian Jews descend from Ethiopian Africans who converted to Judaism. Yemenite Jews descend from Arabs who converted to Judaism. North African Jewish and Kurdish Jewish paternal lineages come from Israelites. Jewish Y-DNA tends to come from the Middle East, and studies that take into account mtDNA show that many Jewish populations are related to neighboring non-Jewish groups maternally.

Family Tree DNA: Genetic Testing Service
Get genetically tested to discover your relationship to other families, other Jews, and other ethnic groups

***Featured books on genetics*:**
The Family Tree Guide to DNA Testing and Genetic Genealogy
NextGen Genealogy: The DNA Connection
The Seven Daughters of Eve: The Science that Reveals Our Genetic Ancestry
Jewish Genetic Disorders: A Layman's Guide
Abraham's Children: Race, Identity, and the DNA of the Chosen People

Jacob's Legacy: A Genetic View of Jewish History
Legacy: A Genetic History of the Jewish People
Endogamy: One Family, One People
The Maternal Genetic Lineages of Ashkenazic Jews

1
Studies of Modern Jewish Populations

Advanced genetic testing, including Y-DNA and mtDNA haplotyping, of modern Jewish communities around the world, has helped to determine which of the communities are likely to descend from the Israelites and which are not, as well as to establish the degrees of separation between the groups. Important studies archived here include the University College London study of 2002, Ariella Oppenheim's study of 2001, Ariella Oppenheim's study of 2000, Michael Hammer's study of 2000, Doron Behar's study of 2008, Steven Bray's study of 2010, and others.

Key findings:

- The main ethnic element of Ashkenazim (German and Eastern European Jews), Sephardim (Spanish and Portuguese Jews), Mizrakhim (Middle Eastern Jews), Juhurim (Mountain Jews of the Caucasus), Italqim (Italian Jews), and most other modern Jewish populations of the world is Israelite. The Israelite haplotypes fall into Y-DNA haplogroups J and E.
- Ashkenazim also descend, in a smaller way, from European peoples from the northern Mediterranean region (including Italians and French) and even less from Slavs. We know most of the European ancestry came from women who married into the community since the Ashkenazic haplogroups of European origin are usually mtDNA rather than Y-DNA. Unexpectedly, most Ashkenazim have a tiny fraction of East Asian ancestry. Their typically East Asian mtDNA haplogroups include M33c2 and N9a3. The characteristically East Asian hair thickness allele 1540C for the EDAR gene is carried by about 1.7% of Ashkenazim.
- Dutch Jews from the Netherlands also descend from northwestern Europeans.
- Sephardim also descend, in a smaller way, from various non-Israelite peoples.
- Georgian Jews (Gruzinim) are a mix of Georgians and Israelites.
- Moroccan Jews, Algerian Jews, and Tunisian Jews are mainly Israelites.

- Libyan Jews are mainly Israelites who may have mixed somewhat with Berbers.
- Yemenite Jews (Temanim) are almost exclusively descended from Yemenite Arabs and are closely related to Saudi Arabs and Bedouins. They also have a small portion of East African maternal ancestry but lack the West African admixture that Yemenite Muslims have.
- Ethiopian Jews are almost exclusively Ethiopian, with little or no Israelite ancestry.
- Bene Israel Jews and Cochin Jews of India have much Indian ancestry in their mtDNA.
- Palestinian Arabs are probably partly Israelite.

2
Studies of Cohens and Levites

Click the link above to see studies and commentaries related to Y-DNA tests of Cohens and Levites.

Key findings:

- The Cohen Modal Haplotype is found among many Jewish populations of the world, including Ashkenazim, Sephardim, and the Bene Israel of India.
- The Cohen Modal Haplotype, which belongs to haplogroup J, was a component of the ancient Israelite population, and especially common among the Cohens (priests of the Temple in Jerusalem).
- The Cohen Modal Haplotype is not exclusively found among Jews, but rather is also found among Kurds, Armenians, Italians, Palestinian Arabs, and a few other peoples.
- About half of Ashkenazic Levites possess haplotypes belonging to the R1a1 haplogroup. This is almost never found among Sephardic Levites, and is rare in non-Ashkenazic populations as a whole, but the phylogeny of the branching out of R1a1 shows the Ashkenazic variety of R1a1 to be distinct from both the Eastern European and Central Asian forms of R1a1, contradicting the theory that Slavs or Khazars who converted to Judaism introduced this lineage into Ashkenazim. The actual source of Ashkenazic R1a1 was a population in Iran.

3
Studies on Jewish Genetic Diseases and Disease Protections

This section has studies and commentaries related to Jewish genetic diseases such as Mediterranean Fever, Tay-Sachs, and pemphigus vulgaris. Learn about their geographical and ethnic diffusion, and what this often tells us about the degree of closeness between Jews and certain non-Jewish ethnic groups like Iranians, Anatolian Turks, and Palestinian Arabs.

Key findings:

- The 185delAG breast cancer mutation is found among both Ashkenazim and Moroccan Jews.
- A mutation causing Factor XI Deficiency is found among both Ashkenazim and Iraqi Jews.
- One form of the gene causing Familial Mediterranean Fever is found among Ashkenazim, Iraqi Jews, Druzes, and Armenians. Another form of the gene is found among Iraqi Jews, North African Jews, and Armenians. Some Sephardim, Arabs, and Anatolian Turks also have the gene.
- Gaucher Disease is found among both Ashkenazim and some Europeans.
- The mutation DFNB1, which causes deafness, is found among both Ashkenazim and Palestinian Arabs.
- The mutation G2019S sometimes associated with Parkinson's Disease is found among both Ashkenazim and Arabs.
- I1307K, an allele that causes Colorectal Cancer, is found among Ashkenazim, Sephardim, and Arabs.
- The pemphigus MHC susceptibility gene is found among both Ashkenazim and Iranians.
- The protective CCR5-D32 allele may have been introduced into the Ashkenazic population by a non-Jewish population.

4

Studies that test the potential Israelite ancestry of certain non-Jewish populations

This is a section related to the ancestry of such groups as the Samaritans, Lembas, and American Latinos of the southwest.

Key findings:

- Samaritans are descended from Israelite men and Assyrian women.

- Those Lembas who possess the Cohen Modal Haplotype have partial Middle Eastern ancestry, but it is distinct from the Jewish variety of this haplotype. The Buba clan is especially Middle Eastern in its paternal DNA.
- Many Spanish-speaking Latinos of the American Southwest are descended from Anusim (Spanish Jews who were forced to convert to Catholicism).
- The Mizo people of northeastern India, the self-styled "B'nei Menashe", have no proven genetic connection to the Israelites.

5
Studies of Karaites

This section related to the ancestry of the Karaite Jews of Eastern Europe (Ukraine, Lithuania, Poland), Iraq, and Egypt includes original content.

Key findings:

- The East European Karaite have dominant Middle Eastern (Southwest Asian) elements and frequently match Ashkenazi Jews, Sephardi Jews, Mizrahi Jews, Egyptian Karaites, and non-Jewish peoples of Southwest Asia (the Middle East) and the Caucasus (especially the South Caucasus, but occasionally the North Caucasus). They also sometimes matched Europeans.
- Karaite Cohens are sometimes related to Ashkenazi Cohens.
- Afghan Jews sometimes simultaneously match Crimean Karaites, Ashkenazi Jews, Sephardi Jews, and Kurdish Jews paternally.
- Egyptian Karaites sometimes match Ashkenazi Jews.

6
Studies of Pre-Modern Jewish DNA

• Tzarfati Jews in Norwich, England who died in 1190: "Genomes from a medieval mass burial show Ashkenazi-associated hereditary diseases pre-date the 12th century" by Selina Brace, Yoan Diekmann, Thomas Booth, Ruairidh

Macleod, Adrian Timpson, Will Stephen, Giles Emery, Sophie Cabot, Mark G. Thomas, and Ian Barnes in *Current Biology* 32:20 (October 24, 2022): pages 4350-4359.e6, doi:10.1016/j.cub.2022.08.036

• Ashkenazic and Knaanic Jews in Erfurt, Germany who died in the 1300s: "Genome-wide data from medieval German Jews show that the Ashkenazi founder event pre-dated the 14th century" by Shamam Waldman, Daniel Backenroth, Éadaoin Harney, Stefan Flohr, Nadia C. Neff, Gina M. Buckley, Hila Fridman, Ali Akbari, Nadin Rohland, Swapan Mallick, Iñigo Olalde, Leo Cooper, Ariel Lomes, Joshua Lipson, Jorge Cano Nistal, Jin Yu, Nir Barzilai, Inga Peter, Gil Atzmon, Harry Ostrer, Todd Lencz, Yosef E. Maruvka, Maike Lämmerhirt, Alexander Beider, Leonard V. Rutgers, Virginie Renson, Keith M. Prufer, Stephan Schiffels, Harald Ringbauer, Karin Sczech, Shai Carmi, and David Reich in *Cell* 185:25 (December 8, 2022): pages 4703-4716.e16, doi:10.1016/j.cell.2022.11.002

• Catalonian Jews in Tàrrega, Spain who died in 1348: "Uncovering a Medieval Pogrom: Genetic History of a Jewish Community in Catalonia (Spain)" by Laura Pallarés-Viña, Daniel R. Cuesta-Aguirre, M. Rosa Campoy-Caballero, Núria Armentano, Anna Colet, Assumpció Malgosa, and Cristina Santos in *Genes* 17:3 (March 23, 2026): article number 358, doi:10.3390/genes17030358

• An upcoming study by David Reich, Arie Shaus, Israel Finkelstein, et al. examines the Y-DNA, mtDNA, and autosomal DNA of ancient Israelites who were buried around 750-650 B.C.E. in a tomb in Abu Ghosh, Israel, near Jerusalem. Some of the results are discussed in "In First, Archaeologists Extract DNA of Ancient Israelites" by Ariel David in *Ha'aretz*, October 9, 2023. A conference paper was presented on October 11, 2023, with three more complete scientific publications to follow. One is "Ancient Mitochondrial DNA Analysis of an Iron II Burial Cave on the Slope of Tel Kiriath-Yearim" by Arie Shaus, David Reich, Gideon Goldenberg, Liora Freud, Vered Eshed, and Israel Finkelstein on pages 49-67 in volume 16 of the book series *New Studies in the Archaeology of Jerusalem*, edited by Yiftah Shalev, Orit Peleg-Barkat, Yehiel Zelinger, and Yuval Gadot and published in 2023 in Jerusalem. The second is "The Iron II Burial Cave: Ancient DNA Sampling and Analysis of Uniparental Markers" by Arie Shaus and David Reich on pages 311-318 in the book *Kiriath-jearim: The Shmunis Family Excavations* edited by Israel Finkelstein and Thomas Römer, published in July 2025 by Eisenbrauns. The third article will include autosomal data.

Avenues for further exploration

Medieval Hunnic and Turkic peoples do not share many DNA lineages with modern Jews

Scientific advances have recently made possible the testing of ancient DNA from bones, teeth, hair, etc. and many extinct tribes are being tested. For instance, LL. Kang et al. studied the remains of ancient Huns for their 2013 paper "Y chromosomes of ancient Hunnu people and its implication on the phylogeny of East Asian linguistic families" in which they managed to identify these Y-DNA haplogroups found among them: Q-M242, Q-M3, N-Tat, C-M130, and R1a1.

DNA was recovered from an early-medieval Hun buried in Hungary and his Y-DNA haplogroup is L while his mtDNA haplogroup is D4j12.

"The Genetics of the Medieval Khazars" is our page presenting available studies on the DNA of the Turkic Khazar people who lived in the kingdom of Khazaria in the 600s-900s. These studies did not find any connection between the Khazars and modern Jewish populations. None of the Khazars' Y-DNA or mtDNA haplogroups belong to Jewish branches, and genomewide they have starkly different genetic profiles.

DNA from 31 Avars from early-medieval southeastern Hungary included the East Eurasian mtDNA haplogroups C, M6, D4c1, and F1b as well as (more frequently) some European mtDNA haplogroups. 23% of the Hungarian conquerors (mainly Magyars, but said to have been joined by Khazars) belonged to the "Central and East-Eurasian haplogroups (A, B, C, D, F, G, M)". Supplementary Table S11 (Tab 11 in the spreadsheet) specifies A, A10, A11, A12a, B4, B4c1b, C, C4a1, C4a2, D4c1, D4h1, D4h4a, D4i, D4m2, D4m2a, F1b, G2a, M, M7, N1a1a1a, N1a1a1a1a, and N1b1.

"Ancient genome of Empress Ashina reveals the Northeast Asian origin of Göktürk Khanate" by Xiao-Min Yang, Hai-Liang Meng, et al. in *Journal of Systematics and Education* (January 9, 2023) identified the mtDNA haplogroup of Empress Ashina of the Göktürk Khanate as F1d in Table S1.

Some ancient peoples of Israel share DNA lineages with modern Jews

"Semitic Duwa" informed us that Polish geneticists are testing ancient Judean samples. He also wrote that ancient Judean mtDNA samples were collected from the tomb of the shroud in Akeldama in Jerusalem and that "Most samples belonged to MtDNA haplogroups W (5 samples) and H (around four samples). Some of the (presumably) H samples might've been V or J1 instead. This is all to be found in Matheson et al. 2009." Jean Manco provided a table of Matheson's study's specific results.

The scientific paper "The genetic structure of the world's first farmers" by Lazarides et al. to be formally published in the future examines the Y-DNA haplogroups of Natufians of ancient Israel from about 12500 to 9500 BCE. One of the

samples was in Y-DNA haplogroup E1b1, two were in E1b1b1b2, and two were in CT.

Canaanite DNA's heavy concentration of West Asian DNA

The Canaanites were related to the Israelites. The autosomal DNA of an ancient Canaanite person from the city of Sidon in southern coastal Lebanon has the following scores above 1 percent in Eurogenes K36: 29.96% Near Eastern, 21.74% East Mediterranean, 19.51% Arabian, 9.73% Italian, 7.12% Armenian, 5.54% West Mediterranean, 1.8% West Caucasian, 1.7% Northeast African, 1.2% North African, and 1.18% North Caucasian.

Further Karaite DNA research would be helpful

The DNA of the Egyptian Karaites remains to be studied on a large-scale basis. We report on our handful of data related to that branch of Karaites at our Karaites page. We have no samples from Turkish Karaites or Y-DNA or mtDNA lineages from Iraqi Karaites. The DNA of the Crimean Karaites has been studied more thoroughly. Small-scale testing of Lithuanian-Polish and Crimean Karaites occurred during the years 2005 and 2006 and the results were published in the 2nd edition of *The Jews of Khazaria* in October 2006. More Crimean Karaite samples were tested later. The tests were upgraded to 37 markers in 2009-2010 and yielded more precise results, and more matches were located as well. Five tests were upgraded to 67 markers in 2011. As of August 16, 2011 we have 28 total participants in our Lithuanian-Polish and Crimean Karaite Y-DNA and mtDNA projects. The latest analysis is published here.

Bennett Greenspan, collaborating with geneticist Dr. Michael Hammer, established Family Tree DNA Genealogy by Genetics, Ltd. in 2000 to investigate the roots of European Jews and family genealogies. Visit his site to see if you may benefit from their services. This site is an affiliate.

Aish HaTorah exposes the myth of a separate Jewish race: "Jews are not a race. Anyone can become a Jew - and members of every race, creed and color in the world have done so at one time or another. There is no distinguishing racial physical feature common only to Jews."

Rabbi Harold M. Schulweis explains the nature of Judaism: "One of the unique aspects of Judaism is its rejection of Judaism as a biological entity, an inherited spiritual DNA, racial or ethnic. The point is that being a Jew is not a matter of genes and chromosomes. To the contrary, Judaism is the first religion to recognize the 'ger', the stranger who chooses to identify himself with Judaism. Judaism is not rooted in race or clan or in a genetic matter but a religious tradition of choice."

In Rabbi Jonathan Sacks's book *Future Tense: Jews, Judaism, and Israel in the Twenty-First Century* (2009) on page 62 briefly mentioned (and almost endorsed) Arthur Koestler's theory of Khazar origins for Ashkenazim and wrote: "Judaism is not an ethnicity and Jews are not an ethnic group. Go to the Western Wall in Jerusalem and you will see Jews of every colour and culture under the sun, the Beta Israel from Ethiopia, the Bene Israel from India, Bukharan Jews from central Asia, Iraqi, Berber, Egyptian, Kurdish and Libyan, the Temamim from Yemen, alongside American Jews from Russia, South African Jews from Lithuania, and British Jews from German-speaking Poland. Their food, music, dress, customs, and conventions are all different. Jewishness is not an ethnicity but a living lexicon of ethnicities."

The answer is that Jews are a religion and a civilization, but not a race or singular ethnic group (the latter two definitions marginalize proselytes). As Rabbi Rami Shapiro said: "There is only one response to Who is a Jew? that works: A Jew is one who takes Judaism seriously. One who takes Judaism seriously studies it, argues with it, and lives it." The proper name of the separate ethnic group that most Jews descend from is Israelite.

Wim Penninx's "Catalogue of Y-DNA Jewish Branches" includes data on the distributions and origins of subclades among Ashkenazic Jews, Sephardic Jews, Romaniote Jews, Mizrahi Jews, and Samaritans. One of those lineages is the focus of "Excavating E-Y6923" by Josh Lipson, and for more updated information see his later article "Between Sicily and Tunisia: an ancient Jewish lineage spans the world". Another one is the focus of Jeffrey Wexler's site "R1a-Y2619 Ashkenazi Levites". Wexler's other site, "Ashkenazi Y-DNA and mtDNA", lists other lineages large and small. Joshua Harth wrote "Jewish Mt-DNA Spotlight: HV1b2".

The genetic commonalities between modern Israelite-descended Jews are shown and discussed in Erik L.'s Jewish Genes Blog.

Leo Cooper's essay "What is Sephardic ancestry and how can we find it?" discusses the autosomal DNA of Jews from Morocco, Tunisia, Greece, Turkey, Bulgaria, and beyond.

For historical and archaeological perspectives on these issues, visit our companion pages Are Russian Jews Descended from the Khazars?, Are Russian Jews Descended from German and Bohemian Jews?, and Sephardic Jews in Galitzian Poland and Environs.